

FORM PTO-1390 (Modified)
(REV 10-95)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 U.S.C. 371

990372

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/446538

INTERNATIONAL APPLICATION NO.
PCT/CH98/00261INTERNATIONAL FILING DATE
17 June 1998PRIORITY DATE CLAIMED
27 June 1997

TITLE OF INVENTION

Method and Device for Copntrolling the Movement of a Teeming Ladle Having a Low Teeming Height
in a Teeming Installation Device

APPLICANT(S) FOR DO/EO/US

LAUPER, Fritz

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☒ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 18 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☒ A **FIRST** preliminary amendment.
A **SECOND** or **SUBSEQUENT** preliminary amendment.
16. ☐ A substitute specification.
17. ☐ A change of power of attorney and/or address letter.
18. ☒ Certificate of Mailing by Express Mail
19. ☒ Other items or information:

a.) translation of specification and claims as amended before the International Preliminary Examination Authority;
b.) a Post Card Receipt

Page 2 of 2

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(f) AND 1.27 (c)) - SMALL BUSINESS CONCERN**

Docket No.
990372

Serial No.

Filing Date

27 December 1999

Patent No.

Issue Date

Applicant/ LAUPER, Fritz
Patentee:

Invention: **Method and Device for Controlling the Movement of a Teeming Ladle having a Low Teeming Height in a Teeming Installation**

I hereby declare that I am:

- ☒ the owner of the small business concern identified below:
☐ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN: **HUBO ENGINEERING GMBH**ADDRESS OF CONCERN: **Hauptstrasse 313B, CH-3266 Wiler bei Seedorf, Switzerland**

I hereby declare that the above-identified small business concern qualifies as a small business concern as defined in 37 CFR 1.9(d), and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the above identified invention described in:

- ☒ the specification filed herewith with title as listed above.
☐ the application identified above.
☐ the patent identified above.

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed on the next page and no rights to the invention are held by any person, other than the inventor, who could not qualify as an independent inventor under 37 CFR 1.9(c) or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey, or license any rights in the invention is listed below:

- ☒ no such person, concern or organization exists.
☐ each such person, concern or organization is listed below.

FULL NAME

ADDRESS

☐

Individual

☐

Small Business Concern

☐

Nonprofit Organization

FULL NAME

ADDRESS

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Individual

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Small Business Concern

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Nonprofit Organization

FULL NAME

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Small Business Concern

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Nonprofit Organization

FULL NAME

ADDRESS

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Individual

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Small Business Concern

☐

Nonprofit Organization

Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

NAME OF PERSON SIGNING:

Fritz Lauper

TITLE OF PERSON SIGNING

OTHER THAN OWNER:

Owner

ADDRESS OF PERSON SIGNING:

Hauptstrasse 313BCH-3266 Wiler bei SeedorfSwitzerland

SIGNATURE:



DATE:

22 December 1999

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

International Application No.: PCT/CH98/00261
International Filing Date: 17 June 1998
Priority Claimed: 27 June 1997
Inventor: LAUPER, Fritz
For: Method and Device for Controlling the Movement
of a Teeming Ladle Having a Low Teeming Height
in a Teeming Installation Device

86 Sparks Street
Cambridge, MA 02138-2216

27 December 1999

Hon.
Assistant Commissioner for Patents
Washington, DC 20231

Box PCT

**Preliminary Amendment Prior to Calculation
of Claims Fees**

Sir:

With a view to avoiding excess claims fees otherwise due and to putting the English translation of the subject International Application into a format believed to comply with present U.S. patent prosecution practice, Applicant courteously requests entry of the following amendment:

In the Specification:

Page 1: cancel;
page 2, line 5: insert --Method and Device for Controlling the Movement of a Teeming Ladle Having a Low Teeming Height in a Teeming Installation Device--;

page 2, line 12: insert --1. Field of the Invention.--;

line 13: change "for" to --of controlling-- and delete "control";

line 14: delete "according to the preamble of patent claim 1";

line 15: delete ", according to the preamble of patent claim";

line 15: delete "4";

line 19: after "into" insert --successively furnished-- and delete "supplied after one another";

line 21: change "with a" to --of-- and "runs" to --extends--;

line 23: change "in a manner" to --,--

line 29: delete "on", change "with" to --at-- and "of this" to --thereof--;

line 30: change "have" to --suffer from-- and "with" to --at--;

line 31: change "in the region" to --near--;

page 3, line 1: change "lying" to --positioned--;

line 3: change "caused by" to --the teeming height increases because of-- and delete ", the teeming height";

line 4: delete "increases";

line 6: change "lying" to --positioned-- and "be insufficiently" to --not be--;

line 7: after "reached" insert --in a satisfactory manner--;

line 8: change "expensive changes. With" to --costly modifications.

In-- and delete "often";

line 9: after "must" insert --often--;

line 16: change "procedure" to --operation, and because of a stationary tilting axis may be displaced further towards the middle of the teeming mould,--;

line 17: correct "distanmce" to --distance-- and delete ", with the help of a";

line 18: delete;

line 19: delete "mould";

page 3, line 27: correct "amd" to --and--;

page 4, line 13: change "the" (first occurrence) to --an--;

line 14: correct "provided" to --provide--, after "for" insert --controlling-- and delete "control";

line 15: change "with" (second occurrence) to --at--;

line 18: delete "now";

line 19: change "which comprises the characterising features of patent claim 1" to --as hereinafter set forth in greater detail--;

line 20: delete;

line 21: delete;

line 25: change "one" to --a preferred-- and delete "example";

line 26: change ". There is shown" to --, in which--;

line 28: change "a lateral" to --is a side elevational--;

line 29: change "a plan" to --is a top elevational--;

line 30: after "3" insert --is--;

line 31: after "4" insert --is-- and correct "scetched" to --sketched--;

page 5, line 5: change "vehicle" to --carriage--, "transversable" to --horizontally moveable-- and after "4" insert --in a direction Y,--;

line 6: delete "horizontally in the Y direction", change "vehicle" to --carriage-- and "carries" to --supports--;

line 7: change "vehicle" to --carriage--, delete "displaceable" and change "to this" to --displaceable in a direction X--;

line 8: delete "in the X-direction" and change "vehicle" to --carriage--;

line 9: change "construction" to --structure--;

line 11: change "construction" to --structure-- and after "9" insert --, there is provided--;

line 12: after "14" insert --for moving it up and down-- and delete "is liftably and lowerably arranged";

line 19: change "On" to --During-- and "vehicle 3 with" to --carriage 3

and--;

page 5, line 20: change "traversed so far" to --moved--;

line 22: after "iron" insert --23--;

page 6, line 14: correct "reassumed" to --resumed--;

line 16: change "with an empty" to --when the--;

line 17: after "machine" insert --is empty-- and change "procedure" to --operation--;

line 18: after "first" insert --one--, after "with" insert --a filled-- and delete "which is full";

line 25: correct "part" to --partially--, after "recess" insert --28-- and change "journal" to --stub--;

line 28: change "projection" to --protrusion--;

line 29: delete "there"

line 30: delete "results" and after "advantages" insert --result--;

page 7, line 8: change ", with the ladle exchange" to --;-- and after "exchanged" insert --whenever a ladle is changed--;

line 9: change "application" to --insertion--;

line 10: change "mounting attached in" to --bracket mounted on--;

line 15: change "destroying" to --absorbing--;

line 19: change "teeming" to --cast--;

line 20: change "independently" to --regardless--, "accompanying" to --height of an associated-- and delete "height";

line 21: correct "electronical" to --electronic-- and change "must" to --have to--;

line 22: change "correspondingly newly programmed so that" to --appropriately reprogrammed to mach-- and delete "are matched".

page 8, line 1: change "CLAIMS" to --What is claimed is:--;

page 10, line 5: after "ABSTRACT" insert --OF THE DISCLOSURE--; and

line 16: delete.

page 3, line 27: correct "amd" to --and--;

page 4, line 3: change "the" (first occurrence) to --an--;

line 4: correct "provided" to --provide--, after "for" insert --controlling-- and delete "control";

line 5: change "with" (second occurrence) to --at--;

line 8: delete "now";

line 9: change "which comprises the characterising features of patent claim 1" to --as hereinafter set forth in greater detail--;

line 10: delete;

line 11: delete;

line 15: change "one" to --a preferred-- and delete "example";

line 16: change ". There is shown" to --, in which--;

line 18: change "a lateral" to --is a side elevational--;

line 19: change "a plan" to --is a top elevational--;

line 20: after "3" insert --is--;

line 21: after "4" insert --is-- and correct "scetched" to --sketched--;

line 27: change "vehicle" to --carriage--, "transversable" to --horizontally moveable-- and after "4" insert --in a direction Y,--;

line 28: delete "horizontally in the Y direction", change "vehicle" to --carriage-- and "carries" to --supports--;

line 29: change "vehicle" to --carriage--, delete "displaceable" and change "to this" to --displaceable in a direction X--;

line 30: delete "in the X-direction" and change "vehicle" to --carriage--;

line 31: change "construction" to --structure--;

page 5, line 2: change "construction" to --structure-- and after "9" insert --, there is provided--;

line 3: after "14" insert --for moving it up and down-- and delete "is liftably and lowerably arranged";

line 10: change "On" to --During-- and "vehicle 3 with" to --carriage 3

and--;

page 5, line 11: change "traversed so far" to --moved--;

line 13: after "iron" insert --23--;

page 6, line 5: correct "reassumed" to --resumed--;

line 7: change "with an empty" to --when the--;

line 8: after "machine" insert --is empty-- and change "procedure" to --operation--;

line 9: after "first" insert --one--, after "with" insert --a filled-- and delete "which is full";

line 16: correct "part" to --partially--, after "recess" insert --28-- and change "journal" to --stub--;

line 19: change "projection" to --protrusion--;

line 20: delete "there"

line 21: delete "results" and after "advantages" insert --result--;

line 30: change ", with the ladle exchange" to --;-- and after "exchanged" insert --whenever a ladle is changed--;

line 31: change "application" to --insertion--;

page 7, line 1: change "mounting attached in" to --bracket mounted on--;

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line 11: change "independently" to --regardless--, "accompanying" to --height of an associated-- and delete "height";

line 12: correct "electronical" to --electronic-- and change "must" to --have to--;

line 13: change "correspondingly newly programmed so that" to --appropriately reprogrammed to mach-- and delete "are matched".

page 8, line 1: change "CLAIMS" to --What is claimed is:--;

page 10, line 5: after "ABSTRACT" insert --OF THE DISCLOSURE--; and

line 16: delete.

In the Claims:

Cancel claims 1 - 9 and substitute the following new claims:

10. (New) A method of controlling the pivoting movement of a teeming ladle about a fulcrum relative to a mold of a substantially linear array thereof and provided in a first teeming machine adapted to be moved in a first direction parallel to the array, the ladle comprising a spout provided with a teeming channel of predetermined radius and defining the fulcrum, comprising the steps of:
moving the mold toward the mold in a second direction substantially normal to the first direction;
lifting the mold in a direction substantially vertically relative to the first and second directions; and
pivoting the mold about an axis extending substantially normal to the second direction.
11. (New) The method of claim 10, wherein the moving, lifting and pivoting movements are executed by motors controlled by electronic control means.
12. (New) The method of claim 11, further comprising a second teeming machine adjacent the first teeming machine for continuing the teeming operation when the ladle of the first teeming machine is empty.
13. (New) A teeming machine, comprising:
a first carriage mounted for movement in a predetermined direction relative to an array of molds;
a second carriage mounted on the first carriage for movement relative to the array of molds in a direction substantially normal to the predetermined direction;

a structure extending upwardly from said second carriage and supporting retaining means for movement vertically of the structure;
a suspension plate mounted on the retaining means;
means for pivoting the suspension plate about an axis extending substantially normal to the movement of the second carriage;
a teeming ladle mounted on the suspension plate and provided with a teeming spout directed toward the molds.

14. (New) The machine of claim 13, further comprising a first motor for moving the second carriage, a second motor for vertically moving the retaining means and a third motor for pivoting the suspension plate.
15. (New) The machine of claim 14, further comprising a programmable electronic control for controlling the movements of the first, second and third motors.
16. (New) The machine of claim 13, wherein the suspension plate and the teeming ladle are provided with complementary mounting brackets for removably mounting the teeming ladle on the suspension plate.
17. (New) The machine of claim 13, further comprising pressure gauges intermediate the structure and the control means for terminating the teeming operating in response to changes in the weight of the teeming ladle.
18. (New) The machine of claim 13, wherein the spout of the teeming ladle is provided with an exchangeable spouting stone.
19. (New) The machine of claim 13, wherein the teeming ladle is provided

International Application No.: PCT/CH98/00261

with a slag brick adjacent to the spout stone.

Respectfully submitted,



Karl Hormann
Registration No.: 26,470

Area Code (617)-491-8867

617-491-8867

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BACKGROUND OF THE INVENTION

The present invention relates to a method for the movement control of a teeming ladle according to the preamble of patent claim 1 and to a teeming machine for carrying out the method, according to the preamble of patent claim 4.

Existing automatic foundry installations for the repeated controlled filling of liquid metals from a tiltable ladle into moulds supplied after one another function in the following manner: the molten mass during the teeming runs via a spout stone with a radius R out of the ladle, wherein the tilting axis of the ladle runs at least approximately through the centre of this radius, the so-called theoretical point of rotation of the spout in a manner such that independently of the tilting angle of the ladle approximately equal geometric and thus flow design relationships are to be achieved. The tilting is effected via a controlled drive which via mechanical connection members engages the ladle.

With such installations one achieves an excellent running of the teeming procedure when teeming on, during the teeming and with the completion of this. However such installations have the disadvantage for teeming with a relatively low teeming height the teeming funnel must lie in the region of the edge of the

mould box. With teeming funnels lying further inside and whilst maintaining the required defined safety distance of the ladle body with respect to the mould box, caused by the segment shape of the teeming ladle, the teeming height increases.

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Since teeming funnels lying far inside the mould box may be insufficiently reached, the funnel must be pulled to the edge which with existing models leads to expensive changes. With moulding boxes with weighting iron, often the weighting iron must be modified which again leads to additional cost. However
10 since on the models or weighting irons, changes may not always be carried out, on account of the high teeming height one may only teem with an extended teeming spout. Such a teeming spout is however not suitable for the automatic teeming and with manual teeming can be handled only with difficulty.

15 From EP Patent 592 365 there is known a teeming method in which the teeming ladle, after the first teeming procedure whilst maintaining a certain safety distance of the teeming ladle with respect to the teeming box, with the help of a stationary tilting axis may be displaced further towards the middle of the teeming mould. With this method the stationary tilting axis with the lift drive is
20 attached at the front on the teeming spout and since the tilting bearing required on the tilting axis must likewise be located at a safety distance over the teeming box or the weighting iron, this leads by way of design likewise to a large teeming height. A large teeming height however causes considerable disadvantages; since more kinetic energy must be destroyed a deeper teeming funnel becomes
25 necessary so that the top box may not be optimally exploited. Furthermore more circulation material is required, there is more splatter iron, a more erratic teeming with more turbulence in the funnel, and more sand rinsings and more sand and gas enclosures are to be expected. With mould boxes with weighting iron the teeming height is increased further since the tilting bearing must lie above the
30 weighting iron.

In U.S. Patent 4,112,998 there is described a method of controlling the movement of a teeming ladle about a fulcrum of a spout in which the teeming ladle during casting is pivoted about an axis of rotation W. Prior to casting the teeming ladle is lowered in a vertical direction to the casting level.

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A further method has become known from German Patent 3,532,763 in which during casting a teeming ladle is pivoted about an axis of rotation and is moved towards the mould. These movements serve to determine the position and control the casting jet.

10

BRIEF SUMMARY OF THE INVENTION

It is thus the object of the invention to avoid all mentioned disadvantages and to provided a method and a teeming machine for the movement control of a teeming ladle, with which one may always teem with a lower teeming height even when the teeming funnels are arranged at any location in the mould box, and with which the theoretical point of rotation of the spout is stably guided into the lowest possible position. This object is now achieved by the method and the teeming machine which comprises the characterising features of patent claim 1 and 4. Advantageous embodiment forms of the subject-matter of the invention are specified in the dependent patent claims 2, 3 and 5 to 9.

15
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BRIEF DESCRIPTION OF THE DRAWINGS

Hereinafter one embodiment example of the invention is described in more detail by way of the schematic drawings. There is shown:

25

Fig. 1 a lateral view of the teeming machine

Fig. 2 a plan view of the teeming machine shown in Fig. 1,

Fig. 3 a view of the teeming ladle in the teeming position and

Fig. 4 a scetched detail of the teeming ladle suspension.

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DETAILED DESCRIPTION OF THE INVENTION

According to Fig. 1 the teeming machine 1 on wheels 2 of a longitudinal vehicle 3 is traversable on rails 4 parallel to a teeming mould path indicated at 5, horizontally in the Y-direction. The longitudinal vehicle 3 carries a transverse vehicle 6, which by way of rail guides 7 is displaceable transversely to this by way of a friction motor 8 in the X-direction. On the transverse vehicle 6 there is mounted a tower-like construction of the teeming machine and its control cabin 10 with the electronic control means 11, with an intermediate arrangement of pressure fluid gauge chambers 12. In the construction 9 a retaining means 13 for the teeming ladle 14 in the vertical direction Z is liftably and lowerably arranged. The retaining means 13 is suspended on a chain 15 which is displaced via chain wheels 17 driven by a lift motor 16. In the retaining means 13 there is mounted a tilt shaft 18 which is rotatable about an axis A and which is driven by a tilt motor 19. The tilt shaft 18 pivots a protruding suspension plate 20 in which the teeming ladle 14 is suspendably fastened.

On operation of the teeming machine the longitudinal vehicle 3 with the teeming ladle 14 filled with molten metal mass is traversed so far in the Y-direction until the teeming spout 21 at the height of the teeming funnel 22 is opposite the teeming mould 24 loaded with the weighting iron and which is to be cast, which is effected by the electronic control means 11. The electronic control means 11 is provisionally programmed corresponding to the dimensions of the teeming moulds to be cast. According to the programm which is to be called up the friction motor 8, the lift motor 16 and the tilt motor 19 are controlled in a manner such that the theoretical point of rotation of the spout D with the radius R of the spout stone 25 moves on the curve K1 from above to below which always corresponds to the lowest possible teeming height whilst observing a safety distance. For this the engagement point K of the tilting moment transmitted by the tilt shaft 18 via the suspension plate 20 onto the

teeming ladle 14 must move on the curve K2 correspondingly from bottom to top, which is effected by the suitable control of the mentioned motors.

By way of the pressure fluid gauge chambers 12 functioning as weighing
5 cells the teeming procedure may be automatically stopped by the control means
11 in dependence on the cast molten mass weight and may be reassumed with
the subsequent teeming mould. With this the electronic control means is
programmed such that the lifting and lowering of the teeming spout is carried out
10 in the fast mode during the teeming pause which is to be kept as small as
possible. Until the curves K1 and K2 are passed through and the teeming ladle
is thus emptied, in general several teeming moulds may be filled. With the empty
teeming ladle the teeming machine must traverse to a loading and unloading
station where the empty teeming ladle is replaced by one which is full.
Thereupon after traversing back the teeming procedure may be reassumed. In
15 order to avoid such a temporal interruption in teeming, two teeming machines
may be arranged next to one another so that with an empty teeming ladle of the
first teeming machine the second immediately continues the teeming procedure
whilst the first replaces the empty teeming ladle with one which is full. The only
condition to this method is that the loading and unloading station can be reached
20 in both directions of the rails 4.

With the protruding suspension plate 20 it is possible for the first time to
fasten the teeming ladle only on one of its lateral surfaces and to tilt it. This is
achieved with protruding coupling parts 26 and 27 above on the teeming ladle,
25 wherein the part 26 with a part circular recess engages into an axle journal 29
and the part 27 into an opening 30 of the retaining plate 20 by which means the
teeming ladle is suspended on the retaining plate. For the lateral stabilisation the
teeming ladle 14, with a rounded projection 31, below rests on a protruding part
32 of the suspension plate 20. With this suspension of the teeming ladle there
30 results numerous advantages, thus the teeming machine may be designed
smaller, the accessibility between the teeming ladle and teeming mould is

improved, only a vertical drive in the Z-direction and a tilting drive about the axis A is necessary, a rotational drive for exchanging the ladle is made possible, by which means this exchange is greatly accelerated and ladles of varying size may be applied.

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The spout 21 of the teeming ladle 14 is equipped with an exchangeable spout stone 25. In this manner the stone may be kept smaller and more economical, with the ladle exchange it may be simply and quickly exchanged and fireproof material is saved. The exact application of the spout stone is effected by a mounting attached in the snout so that the radius of the spout stone on teeming moves exactly about the theoretical point of rotation of the spout D, by which means teeming flow fluctuations during the complete tilting procedure are avoided.

For holding back the slag, for breaking the waves and for destroying the kinetic energy arising in the ladle by way of the tilting in the vicinity of the spout 21 there is applied a specially formed slag brick 33.

With the described teeming machine practically each and every teeming object may be teemed independently of the accompanying mould box height, since with a model change the electronical control means must be correspondingly newly programmed so that the curves K1 and K2 are matched to the new model.

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CLAIMS

1. A method for the movement control of a teeming ladle about a theoretical point of rotation of the spout with at least one teeming machine traversable in a Y direction parallel to a teeming mould path, wherein the teeming ladle during the whole teeming procedure is moved relative horizontally in an X-direction normal to the teeming mould path and vertically to the Y-X direction in a Z-direction and is pivoted about a rotational axis A.
2. A method according to claim 1, wherein an electronic control means of the teeming machine is programmed with the movements in the X and Z direction and with the pivoting about the rotational axis A and is called up for control of means effecting the movements and the pivoting on teeming.
3. A method according to claim 1 or 2, wherein two teeming machines are arranged next to one another, wherein the second teeming machine continues the teeming process when the teeming ladle of the first teeming machine is emptied.
4. A teeming machine for carrying out the method according to one of the claims 1 to 3, with a longitudinal vehicle traversable on rails, wherein on a transverse vehicle (6) displaceable transversely to the longitudinal vehicle (3) there is arranged a tower-like construction (9) in which there is provided a vertically movable retaining means (13) with a suspension plate (20) for the teeming ladle (14), said suspension plate (20) being connected to a tilt shaft (18) rotatably mounted in the retaining device (13).
5. A teeming machine according to claim 4, wherein the transverse vehicle (3) is provided with an electronic control means (11) arranged in a control cabin (10), said control means being controllably connected to a friction motor (8) for displacing the transverse vehicle (6) on rail guides (7), to a lift motor (16) for

lifting and lowering the retaining means (13) by way of chains (15) and to a tilt motor (19) for driving the tilt shaft (18).

6. A teeming machine according to claim 4 or 5, wherein the teeming ladle
5 (14) with two coupling parts (26 and 27) protruding on its sides can be suspended in corresponding counter pieces (29 and 30) of the suspension plate (20).

7. A teeming machine according to one of claims 4 to 6, wherein the tower-
10 like construction (9) and the control cabin (10) are mounted on the transverse vehicle (6) with the intermediate connection of pressure fluid gauge chambers (12).

8. A teeming machine according to one of claims 4 to 7, wherein the teeming
15 ladle (14) is equipped with an exchangeable spout stone (25).

9. A teeming machine according to one of the claims 4 to 8, wherein the
founry ladle (14) in the vicinity of the spout (21) is provided with a slag brick (33).

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Docket No.
990372

Declaration and Power of Attorney For Patent Application

English Language Declaration

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method and Device for Controlling the Movement of a Teeming Ladle having a Low Teeming Height in a Teeming Installation

the specification of which

(check one)

☒ is attached hereto.

☐ was filed on _____ as United States Application No. or PCT International Application Number _____ and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d) or Section 365(b) of any foreign application(s) for patent or inventor's certificate, or Section 365(a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate or PCT International application having a filing date before that of the application on which priority is claimed.

| Prior Foreign Application(s) | | | Priority Not Claimed |
|------------------------------|-------------|------------------------|--------------------------|
| 1554/97 | Switzerland | 27 June 1997 | <input type="checkbox"/> |
| (Number) | (Country) | (Day/Month/Year Filed) | |
| (Number) | (Country) | (Day/Month/Year Filed) | <input type="checkbox"/> |
| (Number) | (Country) | (Day/Month/Year Filed) | <input type="checkbox"/> |

I hereby claim the benefit under 35 U.S.C. Section 119(e) of any United States provisional application(s) listed below:

N/A

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

(Application Serial No.)

(Filing Date)

I hereby claim the benefit under 35 U. S. C. Section 120 of any United States application(s), or Section 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. Section 112, I acknowledge the duty to disclose to the United States Patent and Trademark Office all information known to me to be material to patentability as defined in Title 37, C. F. R., Section 1.56 which became available between the filing date of the prior application and the national or PCT International filing date of this application:

PCT/CH98/00261

17 June 1998

Pending

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

(Application Serial No.)

(Filing Date)

(Status)
(patented, pending, abandoned)

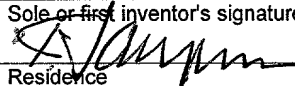
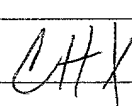
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

Karl Hormann, Esq., Registration No.: 26,470

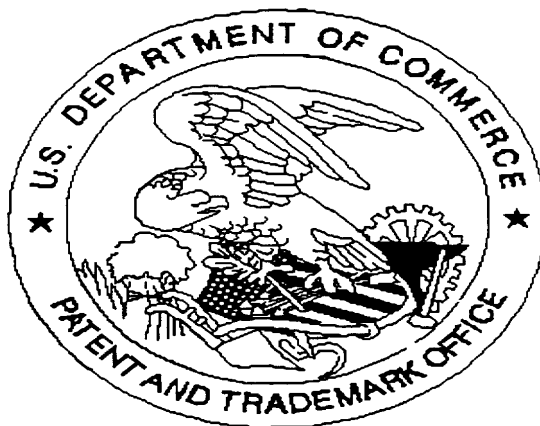
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